

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Sands

Site ID: R069XY019CO

Major Land Resource Area: 69 – Upper Arkansas Valley
Rolling Plains

Physiographic Features

This site occurs on gently sloping to steep dune like hills. These areas do not have a well-defined surface drainage pattern.



Landform: dune, hill, ridge

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	3600	6000
Slope (percent):	1	30
Water Table Depth (inches):	60	60
Flooding:		
Frequency:	none	none
Duration:	none	none
Ponding:		
Depth (inches):	0	0
Frequency:	none	none
Duration:	none	none
Runoff Class:	negligible	low

Climatic Features

The mean average annual precipitation varies from 10 to 14 inches per year depending on location and ranges from 5 inches to over 24 inches per year. Approximately 75 percent of the annual precipitation occurs during the growing season from mid-April to late-September. Snowfall can vary greatly from year to year and can range from 20 to 40 inches per year. Winds are estimated to average about 6 to 7 miles per hour annually. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 60 miles per hour.

The average length of the growing season is 155 days, but varies from 147 to 162 days. The average date of first frost in the fall is October 10, and the last frost in the spring is about May 5. July is the hottest month and January is the coldest. It is not uncommon for the temperature to exceed 100 degrees F during the summer. Summer humidity is low and evaporation is high. The winters are characterized with frequent northerly winds, producing severe cold with temperatures dropping to as low as -35 degrees F.

Growth of native cool season plants begins about April 15 and continues to about June 1. Native warm season plants begin growth about May 1 and continue to about August 15. Regrowth of cool season plants occurs in September and October of most years, depending on moisture.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	147	162
Freeze-free period (days):	169	186
Mean Annual Precipitation (inches):	10	14

Average Monthly Precipitation (inches) and Temperature (°F):

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.28	0.27	12.1	46.4
February	0.14	0.36	15.3	52.9
March	0.25	0.68	20.7	61.5
April	0.73	1.16	28.9	71.8
May	0.90	2.21	38.6	81.1
June	0.83	1.79	47.6	91.4
July	2.34	2.38	53.4	96.2
August	1.62	2.00	51.7	93.7
September	1.04	1.12	43.3	86.0
October	0.90	0.78	32.2	74.2
November	0.49	0.51	21.0	58.1
December	0.43	0.27	14.1	48.6

Climate Stations		Period	
Station ID	Location or Name	From	To
CO6763	Pueblo Army Depot	1971	2000
CO3828	Haswell	1922	2001
CO7287	Rush	1924	2001
CO4834	Las Animas	1930	2001

For detailed information visit the Western Regional Climate Center at <http://www.wrcc.dri.edu/> website.

Influencing Water Features

Wetland Description:	<u>System</u>	<u>Subsystem</u>	<u>Class</u>	<u>Sub-class</u>
None	None	None	None	None

Stream Type: None

Representative Soil Features

The soils of this site are very deep. Typically, they are excessively drained and have rapid or very rapid permeability. Typically, these soils formed in eolian deposits derived from mixed sources. They occur on hills, ridges and dunes. The available water capacity is very low to low. The soil surface layer ranges from 3 to 9 inches thick and is typically sand, loamy fin sand or loamy sand. The pH of these soils ranges from neutral to slightly alkaline in the surface and neutral to moderately alkaline in the substratum. The soil moisture regime is typically ustic aridic, but ranges to aridic in the driest areas of MLRA 69. The soil temperature regime is mesic.

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The Historic Climax Plant Community (HCPC) should display slight to no evidence of rills. Water flow paths, if present, are broken, irregular in appearance or discontinuous with numerous debris dams or vegetative barriers. Moving sand is inherent to this site. Wind scoured soil may exist in areas. Pedestaled plants caused by wind erosion are minor. The soil surface is stable and intact. Sub-surface soil layers are non-restrictive to water movement and root penetration. These soils can be susceptible to erosion hazards where vegetative cover is inadequate.

Major soil series correlated to this ecological site include:
Dwyer, Tivoli, Valent, and Wigton

Soil series that will be correlated to other MLRA's when outdated soil surveys are updated are:
Tivoli; these soils have a thermic temperature regime and will most likely be replaced by Valent.

Other soil series that have been correlated to this site include: none

Parent Material Kind: eolian deposits
Parent Material Origin: igneous and sedimentary
Surface Texture: sand, loamy sand, loamy fine sand
Surface Texture Modifier: none

Subsurface Texture Group: sand, loamy sand
Surface Fragments $\leq 3''$ (% Cover): 0 to 15 percent
Surface Fragments $> 3''$ (%Cover): 0
Subsurface Fragments $\leq 3''$ (% Volume): 0 to 35 percent
Subsurface Fragments $> 3''$ (% Volume): 0 to 15 percent

Rock fragments generally average less than 15 percent and occur as fine gravel.

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	excessively	excessively
Permeability Class:	rapid	very rapid
Depth (inches):	60	60
Electrical Conductivity (mmhos/cm)*:	0	1
Sodium Absorption Ratio*:	0	5
Soil Reaction (1:1 Water)*:	6.6	8.4
Soil Reaction (0.1M CaCl₂)*:	6.4	8.0
Available Water Capacity (inches)*:	1.2	2.8
Calcium Carbonate Equivalent (percent)*:	0	15

*These attributes represent 0-40 inches in depth or to the first restrictive layer.

Plant Communities

Ecological Dynamics of the Site:

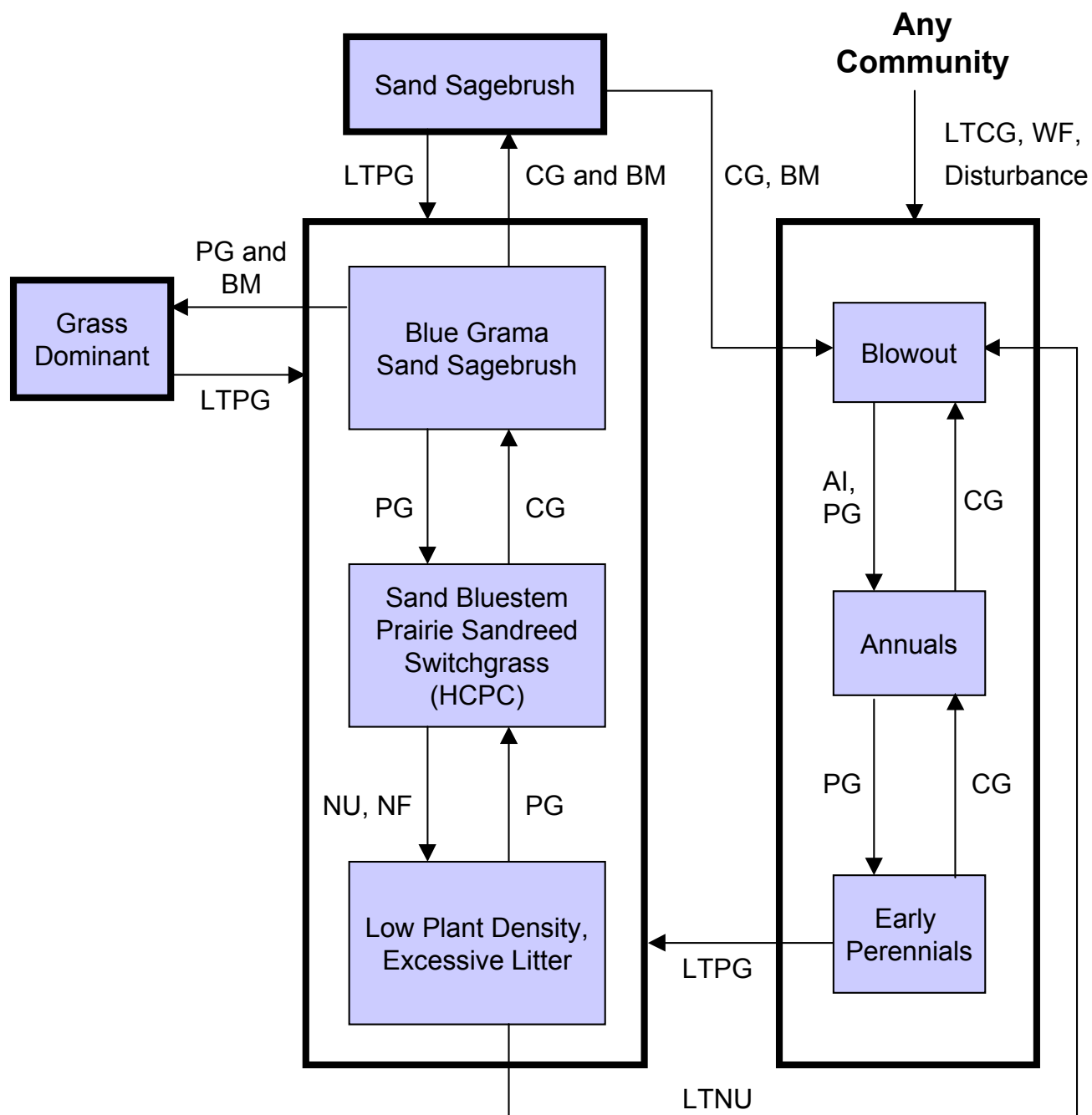
Continuous grazing without adequate recovery opportunities following each grazing event during the growing season will initially cause blue grama and sand sagebrush to increase. Species such as sand bluestem, yellow Indiangrass, switchgrass, prairie sandreed, western sandcherry, leadplant and palatable forbs will decrease in frequency and production. Brush management (spraying) will initially reduce sand sagebrush as well as other forbs and shrubs. Brush management followed by continuous grazing can eliminate remaining grass leaving established or reestablishing sagebrush. Prescribed grazing that allows adequate recovery periods following brush management will result in a grass dominated plant community. Long-term non-use, continuous grazing, wildfire, brush management or any type of physical disturbance can lead to serious erosion problems on these fragile soils.

Drier and warmer climatic conditions exist in the central portion of MLRA-69. This area includes the eastern half of Pueblo county, northern Otero, extreme northwestern Bent, western edge of Kiowa, southern edge of Lincoln and all of Crowley County. These conditions are primarily caused by a rain shadow effect from the southern Rocky Mountains. Evapotranspiration rates (atmospheric demand) will be higher in this area of MLRA-69. Total annual production will typically be lower.

The historic climax plant community (description follows the plant community diagram) has been determined by study of rangeland relic areas, areas protected from excessive disturbance, seasonal use pastures, short duration/time controlled grazing and historical accounts.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways (arrows) among communities. Bold lines surrounding each plant community or communities represent ecological thresholds. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

Plant Communities and Transitional Pathways



AI - animal impact, **BM** - brush management, **CG** - continuous grazing without adequate recovery period, **HCPC** - Historic Climax Plant Community, **LTCG** - long term continuous grazing (>25 yrs), **LTNU** - long term non-use (>25 yrs), **LTPG** - long term prescribed grazing (>25 yrs), **NF** - no fire, **NU** - non-use, **PG** - prescribed grazing with adequate recovery period, **WF** - wildfire

Plant Community Composition and Group Annual Production

			Sand Bluestem, Prairie Sandreed, Switchgrass (HCPC)		
COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES			1	1050 - 1275	70 - 85
sand bluestem	Andropogon hallii	ANHA	1	300 - 450	20 - 30
prairie sandreed	Calamovilfa longifolia	CALO	1	225 - 300	15 - 20
switchgrass	Panicum virgatum	PAVI2	1	150 - 300	10 - 20
Indiangrass	Sorghastrum nutans	SONU2	1	75 - 150	5 - 10
needleandthread	Hesperostipa comata ssp. comata	HECOC8	1	75 - 105	5 - 7
blue grama	Bouteloua gracilis	BOGR2	1	45 - 105	3 - 7
little bluestem	Schizachyrium scoparium	SCSC	1	45 - 105	3 - 7
blowout grass	Redfieldia flexuosa	REFL	1	15 - 45	1 - 3
sand dropseed	Sporobolus cryptandrus	SPCR	1	15 - 45	1 - 3
sideoats grama	Bouteloua curtipendula	BOCU	1	15 - 45	1 - 3
hairy grama	Bouteloua hirsuta	BOHI2	1	15 - 30	1 - 2
Indian ricegrass	Achnatherum hymenoides	ACHY	1	15 - 30	1 - 2
sandhill muhly	Muhlenbergia pungens	MUPU2	1	15 - 30	1 - 2
western wheatgrass	Pascopyrum smithii	PASM	1	15 - 30	1 - 2
bottlebrush squirreltail	Elymus elymoides ssp. elymoides	ELELE	1	0 - 15	0 - 1
red threeawn	Aristida purpurea var. longiseta	ARPUL	1	0 - 15	0 - 1
prairie junegrass	Koeleria macrantha	KOMA	1	0 - 15	0 - 1
sand paspalum	Paspalum setaceum	PASE5	1	0 - 15	0 - 1
thickspike wheatgrass	Elymus lanceolatus ssp. lanceolatus	ELLAL	1	0 - 15	0 - 1
sun sedge	Carex inops ssp. heliophila	CAINH2	1	15 - 30	1 - 2
sand flatsedge	Cyperus schweinitzii	CYSC3	1	0 - 30	0 - 2
other perennial grasses		2GP	1	15 - 75	1 - 5
FORBS			2	150 - 225	10 - 15
annual buckwheat	Eriogonum annuum	ERAN4	2	15 - 30	1 - 2
lemon scurfpea	Psoralidium lanceolatum	PSLA3	2	15 - 30	1 - 2
silky prairie clover	Dalea villosa	DAVI	2	15 - 30	1 - 2
othake	Palafoxia sphacelata	PASP	2	0 - 30	0 - 2
bigtop dalea	Dalea enneandra	DAEN	2	0 - 15	0 - 1
bush morningglory	Ipomoea leptophylla	IPLE	2	0 - 15	0 - 1
Colorado four o'clock	Mirabilis multiflora	MIMU	2	0 - 15	0 - 1
deathcamas	Zigadenus venenosus	ZIVE	2	0 - 15	0 - 1
dotted gayfeather	Liatris punctata	LIPU	2	0 - 15	0 - 1
glia beardtongue	Penstemon ambiguus	PEAM	2	0 - 15	0 - 1
groundplum milkvetch	Astragalus crassicaupus	ASCR2	2	0 - 15	0 - 1
hairy goldaster	Heterotheca villosa	HEVI4	2	0 - 15	0 - 1
heath aster	Symphotrichum ericoides var. ericoides	SYERE	2	0 - 15	0 - 1
Louisiana sagewort	Artemisia ludoviciana	ARLU	2	0 - 15	0 - 1
narrowleaf penstemon	Penstemon angustifolius	PEAN4	2	0 - 15	0 - 1
Nuttall's evolvulus	Evolvulus nuttallianus	EVNU	2	0 - 15	0 - 1
painted milkvetch	Astragalus ceramicus var. filifolius	ASCEF	2	0 - 15	0 - 1
pale evening-primrose	Oenothera albicaulis	OEAL	2	0 - 15	0 - 1
prairie coneflower	Ratibida columnifera	RACO3	2	0 - 15	0 - 1
prairie larkspur	Delphinium carolinianum ssp. virescens	DECAV2	2	0 - 15	0 - 1
prairie spiderwort	Tradescantia occidentalis	TROC	2	0 - 15	0 - 1
purple prairie clover	Dalea purpurea var. purpurea	DAPUP	2	0 - 15	0 - 1
sand lily	Leucocrinum montanum	LEMO4	2	0 - 15	0 - 1
stiff sunflower	Helianthus pauciflorus ssp. pauciflorus	HEPAP2	2	0 - 15	0 - 1
tenpetal blazingstar	Mentzelia decapetala	MEDE2	2	0 - 15	0 - 1
Texas croton	Croton texensis	CRTE4	2	0 - 15	0 - 1
tumbling pigweed	Amaranthus albus	AMAL	2	0 - 15	0 - 1
western ragweed	Ambrosia psilostachya	AMPS	2	0 - 15	0 - 1
white prairie clover	Dalea candida	DACA7	2	0 - 15	0 - 1
wormwood	Artemisia dracunculus	ARDR4	2	0 - 15	0 - 1
other perennial forbs		2FP	2	15 - 45	1 - 3
SHRUBS			3	75 - 225	5 - 15
western sandcherry	Prunus pumila var. besseyi	PRPUB	3	30 - 75	2 - 5
leadplant	Amorpha canescens	AMCA6	3	30 - 75	2 - 5
sand sagebrush	Artemisia filifolia	ARFI2	3	15 - 75	1 - 5
false indigo	Amorpha fruticosa	AMFR	3	0 - 30	0 - 2
small soapweed	Yucca glauca	YUGL	3	0 - 30	0 - 2
plains pricklypear	Opuntia polyacantha	OPPO	3	0 - 15	0 - 1
prairie rose	Rosa arkansana	ROAR3	3	0 - 15	0 - 1
skunkbush sumac	Rhus trilobata	RHTR	3	0 - 15	0 - 1
spreading buckwheat	Eriogonum effusum	EREF	3	0 - 15	0 - 1
other shrubs		2SHRUB	3	15 - 45	1 - 3
	Annual Production lbs./acre		LOW RV* HIGH		
	GRASSES & GRASS-LIKES		685 - 1163 - 1540		
	FORBS		145 - 188 - 230		
	SHRUBS		70 - 150 - 230		
	TOTAL		900 - 1500 - 2000		

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. *RV = Representative value.

Plant Community Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition table shown above has been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

Sand Bluestem, Prairie Sandreed, Switchgrass Plant Community

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HPCP). This plant community evolved with grazing by large herbivores, is well suited for grazing by domestic livestock and can be found on areas that are properly managed with grazing that allows for adequate recovery periods following each grazing occurrence during the growing season.

The historic climax plant community consists chiefly of tall warm season grasses. Principle dominants are sand bluestem, prairie sandreed, and switchgrass. Sub-dominant grasses include Indiangrass, needleandthread, blue grama and little bluestem. Significant forbs and shrubs are lemon scurfpea, dotted gayfeather, prairie clovers, leadplant and western sandcherry. The potential vegetation is about 70-85% grasses and grass-like plants, 10-15% forbs and 5-15% woody plants.

Prescribed grazing that allows for adequate recovery periods after each grazing event and proper stocking will maintain this plant community. Spring grazing and summer deferment will reduce the cool season component of this plant community and increase the warm season component. Spring deferment and summer grazing will increase the cool season component and decrease the warm season component of this plant community.

This plant community is well adapted to the Northern Great Plains climatic conditions and is resistant to many disturbances except continuous grazing, plowing, uncontrolled fire events and urban as well as other land use development. The diversity in plant species allows for high drought tolerance. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. This is a sustainable plant community in terms of soil stability, watershed function and biologic integrity.

Production in this community can vary from 900 to 2000 pounds of air-dry vegetation per acre per year depending on weather conditions and will average 1500 pounds.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number: CO6905

Growth curve name: Warm season dominant, cool season sub-dominant; MLRA-69; upland coarse textured soils.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	10	22	35	15	10	3	0	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Continuous grazing without adequate recovery periods between grazing events will move this plant community toward the *Blue grama, Sand Sagebrush Plant Community*. Reduced production and erosion are a concern.

- Non-use and lack of fire will shift this plant community to the *Low Plant Density, Excessive Litter Plant Community*.
- Prescribed grazing that allows for adequate recovery opportunity following each grazing event and proper stocking will maintain the *Sand Bluestem, Prairie Sandreed, Switchgrass Plant Community (HCPC)*.

Blue Grama, Sand Sagebrush Plant Community

This plant community evolves with continuous grazing without adequate recovery periods between grazing events during the growing season. Sand bluestem, prairie sandreed, yellow Indiangrass, switchgrass, western sandcherry and leadplant have decreased in frequency and production. Blue grama and sand sagebrush are the dominant species. Sand dropseed, red threeawn, slimflower scurfpea, hairy goldaster, croton, western ragweed, stickleaf, lupine, loco, and milkvetch have increased.

Spring grazing and summer deferment will reduce the cool season component (needleandthread, western wheatgrass, Indian ricegrass and sedges) of this plant community and increase the warm season component. Spring deferment and summer grazing will increase the cool season component and decrease the warm season component (sand bluestem, prairie sandreed, switchgrass) of this plant community.

This plant community is relatively stable but at risk of losing some of the tall grass species, palatable forbs and shrubs. The reduction of tall grass species, nitrogen-fixing forbs, key shrub component and increased warm season shortgrass has altered the biotic integrity of this plant community. Nutrient cycle, water cycle and energy flow may be impaired. This is an early stage of desertification.

The production varies from 400 to 1200 pounds of air-dry vegetation per acre per year depending on weather conditions and amount of mid and tall grass species still present. Production will average 850 pounds of air-dry vegetation per acre per year.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number: CO6905

Growth curve name: Warm season dominant, cool season sub-dominant; MLRA-69; upland coarse textured soils.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	10	22	35	15	10	3	0	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Continuous grazing and especially continuous grazing followed by brush management (spraying) will eliminate tall grasses, palatable forbs and shrubs and move this plant community across an ecological threshold to the *Sand Sagebrush Plant Community*. If this treatment continues long enough, accelerated erosion will occur.
- Brush management (spraying) and prescribed grazing will move this plant community across an ecological threshold toward the *Grass Dominant Plant Community*. Loss of palatable forbs, native legumes and shrubs is a concern.
- Prescribed grazing that allows adequate recovery periods between each grazing event and proper stocking will shift this plant community back to the *Sand Bluestem, Prairie Sandreed, Switchgrass Plant Community (HCPC)*.

Low Plant Density, Excessive Litter Plant Community

This plant community occurs when grazing is removed for long periods of time in the absence of fire. Plant composition is similar to the HCPC, however, in time, individual species production and frequency will be lower. Much of the nutrients are tied up in excessive litter. The semiarid environment and the absence of animal traffic to break down litter slows nutrient cycling. Aboveground litter also limits sunlight from reaching plant crowns. Many plants, especially bunchgrasses die off. Thick litter and absence of grazing or fire reduce seed germination and establishment. This plant community will change rapidly with prescribed grazing which allows animal impact and adequate recovery periods between grazing events.

Long-term non-use or rest (greater than 25 years), will cause plant decadence and mortality to increase and erosion (blowouts, wind scoured areas) will most likely occur as bare ground increases. Once this happens it will require increased energy input in terms of practice cost and management to bring back.

Production can vary from 100 to 1000 pounds of air-dry vegetation per acre per year depending on weather conditions and the plants that are present.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number: CO6906

Growth curve name: Warm season dominant, cool season sub-dominant, excess litter; MLRA-69; upland coarse textured soils.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	10	25	30	15	10	3	2	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Long-term non-use or rest will increase bare ground resulting in *Blowouts*. This transition has crossed an ecological threshold and may take greater than 25 years to develop.
- Prescribed grazing that allows for adequate recovery periods following each grazing event can shift this plant community toward the *Sand Bluestem, Prairie Sandreed, Switchgrass Plant Community (HCPC)*. This transition can happen relatively fast.

Sand Sagebrush Plant Community

This plant community is dominated almost entirely with sand sagebrush with little understory species present. Favorable species that remain are few and are protected by the sagebrush. The plant community results from continuous grazing that does not allow adequate recovery periods between grazing events combined with brush management (spraying) even if it includes one growing season of deferment following spraying. Brush management initially reduces the sagebrush and, unfortunately, eliminates or greatly reduces most if not all other forbs and shrubs. Continuous grazing then reduces and can eliminate the remaining grass to a point where only reestablishing or established sagebrush remains. Further brush spraying at this point eliminates the sand sagebrush, which is the only protection the sandy soil has at this point.

Species diversity and production have dropped substantially. Litter levels are low. Watershed function at this point is greatly reduced. Carbon sequestration is greatly reduced. Nutrient cycle and energy flow has been impaired. Blowouts can form or enlarge rather easily. Flow paths can become connected and runoff is possible during intense storms. Desertification is obvious.

Production can vary from 50 to 800 pounds of air-dry vegetation (primarily sand sagebrush) per acre per year depending on the amount of sand sagebrush present and weather conditions.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number: CO6907

Growth curve name: Warm season dominant; MLRA-69; upland coarse textured soils.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	30	40	20	5	0	0	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Continuous grazing and/or brush management will trigger accelerated erosion causing this plant community to form *Blowouts*.
- Long-term prescribed grazing that allows adequate recovery periods following each grazing event can move this plant community back to the *Blue Grama Sand Sagebrush Plant Community* and eventually to the *Sand Bluestem, Prairie Sandreed, Switchgrass Plant Community (HCPC)* or associate successional plant communities assuming an adequate seed/vegetative source is available. This transition may take greater than 25 years to achieve.

Grass Dominant Plant Community

This plant community develops with brush management (spraying) and prescribed grazing. The brush management not only controls the sand sagebrush but unfortunately removes most if not all of the other forbs and shrubs. The community can vary from predominately sand dropseed and red threeawn to nearly pure stands of prairie sandreed and sand bluestem. The species and amounts can vary considerably depending on what was present when the brush management was applied, how long ago it was applied, what kind of prescribed grazing was applied and how long the prescribed grazing was in effect.

There is little plant diversity since most of the forbs and shrubs have been eliminated by brush control efforts. Nutrient and water cycling is impaired due to lack of deep-rooted shrubs, forbs and native nitrogen fixing legumes. Erosion can vary, depending on production/density of grasses.

Production can vary from 250 to 1300 pounds of air-dry vegetation per acre per year depending on the grass species present, their density, and weather conditions.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number: CO6905

Growth curve name: Warm season dominant, cool season sub-dominant; MLRA-69; upland coarse textured soils.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	10	22	35	15	10	3	0	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Long-term continuous grazing without adequate recovery periods following each grazing event, wildfire and/or disturbance, will eventually trigger accelerated erosion, leading to *Blowouts*.
- Long-term prescribed grazing that allows adequate recovery periods following each grazing event (without further brush management) and proper stocking will eventually move this plant community toward the *Sand Bluestem, Prairie Sandreed, Switchgrass Plant Community (HCPC)* or associated successional plant community, assuming an adequate seed/vegetative source is available. This transition may take greater than 25 years to achieve.

Blowout

Long term continuous grazing and/or heavy stocking with continuous grazing, disturbance (tillage, etc.) and/or wildfire bring about this condition. Continuous grazing will only increase the size of the blowouts. This condition is not stable. It consists of bare soil that is continually eroded by wind. Desertification is well advanced.

Transitions or pathways leading to other plant communities are as follows:

- Animal impact and prescribed grazing will begin to heal this plant community and move it toward the *Annuals Plant Community*.

Annuals Plant Community

This early succession plant community can either be the result of continuous grazing applied to an early perennial plant community, or the result of controlled short-term animal impact and prescribed grazing applied to a blowout. Production can vary greatly depending on the plant density and weather conditions in any year. Cheatgrass, Japanese brome, kochia, Russian thistle, sunflower, pigweed, sixweeks fescue and annual buckwheat are common. Wind erosion is a concern.

Production can vary from 0 to 150 pounds per acre of air-dry vegetation per year.

Transitions or pathways leading to other plant communities are as follows:

- Continuous grazing without adequate recovery opportunities, will shift this plant community toward the *Blowout* condition.
- Prescribed grazing that allows adequate recovery periods between grazing events will move this plant community toward the *Early Perennials Plant Community*.

Early Perennials Plant Community

This plant community evolves with continuous grazing from a more advanced plant community or with prescribed grazing from the annuals plant community. Commonly found species include sandhill muhly, blowout grass, Indian ricegrass, Hood's phlox, wormwood sagebrush and lemon scurfpea. Wind erosion continues to be a concern.

Production can vary from 50 to 250 pounds per acre of air-dry vegetation per year.

Transitions or pathways leading to other plant communities are as follows:

- Continuous grazing without adequate recovery periods following each grazing event will move this plant community toward the *Annuals Plant Community* and eventually to the *Blowout* condition.
- Long-term prescribed grazing that allows adequate recovery periods following each grazing event will eventually move this plant community toward the *Sand Bluestem, Prairie Sandreed, Switchgrass Plant Community (HCPC)* or associated successional plant community, assuming an adequate seed/vegetative source is available. This transition may take greater than 25 years to achieve.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

The variety of grasses, forbs, and shrubs found on this ecological site in the various plant communities provides habitat for a wide range of wildlife species. Historic large grazers that influenced these plant communities were bison, elk, and pronghorn. Changes over time have resulted in the loss of bison, the reduction in elk numbers, and pronghorn population swings. Domestic grazers now share these habitats with wildlife. The grassland communities of eastern Colorado are home to many bird species. Changes in the composition of the plant community when moving from the HCPC to other communities on this ecological site may result in dramatic species shifts in the bird community. Because of a lack of permanent water, fish and many amphibians are not expected on this ecological site. Mule and white-tailed deer may use this ecological site, however the shrub cover is too low to expect more than occasional use. The gray wolf, black-footed ferret, and wild bison used this ecological site in historic times. The wolf and ferret are thought to be extirpated from Eastern Colorado. Bison are currently found only as domestic livestock.

Sand Bluestem, Prairie Sandreed, Switchgrass Plant Community

The grasses, forbs, and shrubs in this plant community provide habitat for reptiles such as western rattlesnake and bullsnake. The structural diversity in the plant community on this site provides habitat for Cassin's and Brewer's sparrow, lark bunting, scaled quail, and ferruginous and Swainson's hawks. The combination of mid-tall grasses and shrubs provides habitat for lesser prairie chicken in the eastern part of this ecological site. Small mammals such as white-tailed jackrabbit, badger, swift fox, and several species of mice are common in this plant community. Pronghorn is a typical ungulate found in this community.

Low Density, Excessive Litter; Blowout; Annuals; and Early Perennials Plant Communities

As these communities develop into an open landscape the wildlife species will shift away from HCPC species and toward the species that prefer unvegetated areas and short plants. Texas short-lizard, six-lined racerunner, and black-tailed jackrabbit would be expected more frequently here than in the HCPC. In addition, mountain plover, black-tailed prairie dog, and burrowing owl might use these communities where slopes are less than 5% and vision is unobstructed.

Blue Grama, Sand Sagebrush Plant Community and Sand Sagebrush Plant Community

Species typically associated with sand sagebrush communities are eastern fence lizard, scaled quail, lesser prairie chicken, pronghorn, and mule deer. These species would be expected in these plant communities in all or parts of MLRA 69.

Grass Dominant Plant Community

This plant community can be quite variable. The wildlife species expected here would be those listed for the plant community most similar to this community.

Animal Preferences (Quarterly – 1,2,3,4[†])

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses and Grass-like							
blowout grass	U U D U	N N N N	U U D U	N N N N	N N N N	U U D U	U U D U
blue grama	D P P D	D P P D	D P P D	D P P D	D P P D	D P P D	D P P D
hairy grama	U D P U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
Indian ricegrass	D P D D	D P D D	D P D D	D P D D	D P D D	D P D D	D P D D
Indiangrass	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
little bluestem	U D P U	N D D N	U D P U	N D D N	N D D N	U D P U	U D P U
needleandthread	U P D D	N D N D	U P D D	N D N D	N D N D	U P D D	U P D D
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
prairie sandreed	U D D U	U D U U	U D D U	U U D U	U U D U	U D D U	U D D U
sand bluestem	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
sand dropseed	U D U N	N U D N	U D U N	N U D N	N U D N	U D U N	U D U N
sand flatsedge	N D U U	N D U U	N D U U	N D U U	N D U U	N D U U	N D U U
sandhill muhly	N U N N	N N N N	N U N N	N N N N	N N N N	D U U D	N U N N
sideoats grama	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
sun sedge	U P D D	U P D D	U P D D	U P D D	U P D D	U P D D	U P D D
switchgrass	U D D U	U D U U	U D D U	N N N N	N N N N	U D D U	U D D U
western wheatgrass	U P D D	U P D D	U P D D	U P D D	U P D D	U P D D	U P D D
Forbs							
bigtop dalea	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
bush morningglory	U D P U	U D D U	U D P U	U D D U	U D D U	U D P U	U D D U
deathcamas	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T
dotted gayfeather	U U D U	U D P U	U U D U	U D P U	U D P U	U U D U	U U D U
gilia beardtongue	N U N N	N U U N	N U N N	N U U N	N U U N	N U N N	N U N N
groundplum milkvetch	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
hairy goldaster	U U D U	N N N N	U U D U	N N N N	N N N N	U U D U	N N N N
Louisiana sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
narrowleaf penstemon	U D U U	U P P U	U D U U	U P P U	U P P U	U D U U	U P P U
Nuttall's evolvulus	U U D U	U D D U	U U D U	U D D U	U D D U	U U D U	U U D U
othake	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
painted milkvetch	U U U U	U D U U	U U U U	U D U U	U D U U	U U U U	U D U U
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
prairie larkspur	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T
purple prairie clover	U P P D	U P P U	U P P D	U P P U	U P P U	U P P D	U P P D
sand lily	U D U U	N U U N	U D U U	N U U N	N U U N	U D U U	N U U N
silky prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
snowball sand verbena	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
stiff sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
tenpetal blazingstar	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
Texas croton	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
western ragweed	U D U U	U D U U	U D U U	U D U U	U D U U	U D U U	U D U U
white prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
wild buffalo-gourd	N U U N	N U D N	N U U N	N U D N	N U D N	N U U N	N U U N
wormwood	N N U N	N U U N	N N U N	N U U N	N U U N	N N U N	N N U N
Shrubs							
false indigo	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N
leadplant	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
prairie rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
sand sagebrush	U N N U	U N N U	U N N U	U N N U	U N N U	U N N U	U N N U
small soapweed	D P N D	D P N D	D P N D	D P N D	D P N D	D P N D	D P N D
western sandcherry	D P P D	D U U D	D P P D	P U D P	D U U D	D P P D	P U U P

N = not used; U = undesirable; D = desirable; P = preferred; T = toxic

[†] Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

Animal Community – Grazing Interpretations

The following table lists suggested initial stocking rates for cattle under continuous grazing (year long grazing or growing season long grazing) under normal growing conditions however, *continuous grazing is not recommended*. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity.

Plant Community	Production (lbs./acre)	Stocking Rate (AUM/acre)
Sand Bluestem, Prairie Sandreed, Switchgrass (HCPC)	1500	0.47
Blue Grama, Sand Sagebrush	850	0.27
Sand Sagebrush	*	*
Grass Dominant	*	*
Low Plant Density, Excessive Litter	*	*

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangelands in this area provide yearlong forage under prescribed grazing for cattle, sheep, horses and other herbivores. During the dormant period, livestock may need supplementation based on reliable forage analysis.

* Highly variable; stocking rate needs to be determined on site.

Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group A. Infiltration is high and runoff potential for this site varies from moderate to low depending on ground cover. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to NRCS Section 4, National Engineering Handbook (NEH-4) for runoff quantities and hydrologic curves).

Recreational Uses

This site provides hunting, hiking, photography, bird watching and other opportunities. The wide varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors.

Wood Products

No appreciable wood products are present on the site.

Other Products

None noted.

Supporting Information

Associated Sites

- (069XY021CO) – Choppy Sands
- (069XY026CO) – Sandy

Similar Sites

- (069XY021CO) – Choppy Sands
[steeper slope; less production, more little bluestem]
- (069XY031CO) – Sandy Bottomland
[nearly level to gently sloping, occupies lower landscape position]

Inventory Data References

Information presented here has been derived from NRCS clipping data, numerous ocular estimates and other inventory data. Field observations from experienced range trained personnel were used extensively to develop this ecological site description. Specific data information is contained in individual landowner/user case files and other files located in county NRCS field offices.

Those involved in developing this site description include: Ben Berlinger, Rangeland Management Specialist, NRCS; Scott Woodall, Rangeland Management Specialist, NRCS; Lee Neve, Soil Scientist, NRCS; Julie Elliott, Rangeland Management Specialist, NRCS; Terri Skadeland, Biologist, NRCS.

State Correlation

This site is specific to Colorado (formerly Deep Sands).

Field Offices

Colorado Springs, Cheyenne Wells, Eads, Holly, Hugo, Lamar, Las Animas, Pueblo, Rocky Ford, Simla, Springfield, Trinidad

Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://hpcc.unl.edu>)

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://wcc.nrcs.usda.gov>)

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Site Description Approval

/s/

03/25/2004

State Range Management Specialist

Date